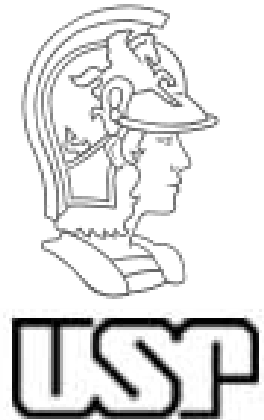


IEEE Distinguished Lecturer

Dia 4 de Fevereiro de 2009
Horário: das 09:30hs as 10:30hs
Anfiteatro da Engenharia Elétrica.

Escola Politécnica da USP
Departamento de Sistemas Eletrônicos - PSI
São Paulo – SP - Brasil
Telefone: (011) 3091-5657



O.Univ.Prof. Dipl.-Ing. Dr.techn. Dr.h.c.

Siegfried Selberherr

Chapter Partner of the IEEE ED South Brasil Section
Distinguished Lecturer of the IEEE ED Society, Fellow of the IEEE

Institute for Microelectronics
TU Wien, Gusshausstr. 27-29
A-1040 Vienna, Austria
Telephone: +43(1)58801-36010 Fax: +43(1)58801-36099 Email: Selberherr@TUWien.ac.at

Strain Engineering in CMOS Devices

Starting with the 90-nm CMOS technology node, strain engineering takes a key position among other technological innovations, because it is cost effective and the beneficial effect of strain on the device performance is comparatively large. Ever since, increasing emphasis is put on strain technologies to further enhance chip performance in upcoming CMOS technology nodes.

The band structure of silicon under arbitrary stress/strain conditions is calculated using the empirical nonlocal pseudopotential method. The method is discussed with a special focus on the strain induced breaking of crystal symmetry. It is demonstrated that under general stress the relative movement of the sub-lattices has a prominent effect on the conduction band masses. This displacement, which cannot be determined from macroscopic strain, is extracted from ab initio calculations.

The transport properties of strained silicon are investigated by solving the semi-classical Boltzmann equation using the Monte Carlo method. It is shown that the change of the electron effective mass induced by uniaxial stress has to be included in accurate models of the electron mobility. A conclusion summarizes the main findings, and important directions for future research are recommended.

Siegfried Selberherr was born in Austria, in 1955. He received the degree of “Diplomingenieur” in Electrical Engineering and the doctoral degree in Technical Sciences from the “Technische Universität Wien” in 1978 and 1981, respectively. Dr. Selberherr has been holding the “venia docendi” on “Computer-Aided Design” since 1984. Since 1988 he has been the Chair Professor of the “Institut für Mikroelektronik”. From 1998 to 2005 he served as Dean of the “Fakultät für Elektrotechnik und Informationstechnik”. His current research topics are modeling and simulation of problems for microelectronics engineering.